

1     What is claimed is:

2                     1.     A fastener which is to be attached to at least one  
3     material sheet, said fastener comprising a filament portion and at least  
4     one bulged massive end portion on a selected end portion of said  
5     filament portion, said bulged massive end portion having a maximum  
6     length in at least two directions perpendicular to an axis direction of  
7     said filament portion separated by an angle large enough that the  
8     outer surface of the end portion measured between the two directions  
9     is larger than the diameter of said filament portion, and further  
10    wherein said bulged massive end portion can be engaged with one  
11    surface of the material sheet, said surface of the material sheet being  
12    opposite an opposing surface thereof through which said filament  
13    portion is inserted.

14                    2.     A fastener according to claim 1, wherein said  
15    bulged massive portions are provided on both end portions of said  
16    filament, respectively.

17                    3.     A fastener according to claim 1, wherein a tag  
18    holding portion is provided at another end of said filament portion  
19    opposite to said end to which said bulged massive portion is  
20    connected.

21                    4.     A fastener according to claim 1, wherein said  
22    bulged massive portion has a configuration selected from a group  
23    consisting a spherical configuration, a semi-spherical configuration, a  
24    cone like configuration, a pyramid type configuration, a truncated  
25    cone, a polygonal sphere, a polygonal semi-sphere, and an ellipsoid  
26    configuration.

27                    5.     A fastener according to claim 4, wherein said  
28    bulged massive portion has a part opposed to said surface of said  
29    material sheet to which said bulged massive portion would be engaged

1 and on which at least one frictional element against said surface of  
2 said material sheet, is provided.

3           6. A fastener according to claim 5, wherein said  
4 frictional element is selected from a group consisting a groove, a  
5 concaved portion, a convexed portion, a projecting member projected  
6 from said surface of said bulged massive portion, a flat like portion,  
7 and a blade like portion.

8           7. A fastener according to claim 1, wherein said  
9 filament portion has a length suitable for attachment to an applied  
10 good.

11           8. A fastener according to claim 1 wherein said bulged  
12 massive end portion is compressible.

13           9. A fastener assembly in which a plurality of said  
14 fasteners as defined by claim 1, are arranged adjacent to each other,  
15 so that each one of said filament portions of said individual fasteners  
16 are arranged in parallel to each other.

17           10. A fastener assembly according to claim 9, wherein  
18 at least one of said bulged massive portions of each one of said  
19 fasteners are simultaneously connected to a rail.

20           11. A fastener assembly according to claim 10, wherein  
21 said bulged massive portions are provided on both end portions of  
22 said filament, and both of said bulged massive portions provided at  
23 both end portions of said filament portion of said respective fasteners  
24 are simultaneously connected to first and second rails, respectively,  
25 said first and second rails being arranged parallel to each other.

26           12. A fastener assembly according to claim 9, wherein  
27 a tag holding portion is provided at another end of said filament  
28 portion opposite to said end to which said bulged massive portion is  
29 connected, and each one of said bulged massive portions provided on  
30 one end portion of said respective filament portions of a plurality of  
31 fasteners is simultaneously connected to a first rail, while each one of

1 said tag holding portions provided on another end portion of said  
2 respective filament portions of a plurality of fasteners is  
3 simultaneously connected to a second rail.

4 13. A fastener assembly according to claim 12, wherein  
5 either one of said bulged massive portions or said tag holding  
6 portions are connected to said respecting connecting bar via a  
7 connecting portion provided on said rail.

8 14. A fastener assembly according to claim 13, wherein  
9 said connecting portions have a configuration in that a diameter  
10 thereof is gradually reduced from a bottom portion thereof directly  
11 connected to said connecting bar to a contacting area formed on either  
12 one of a surface of said bulged massive portion or said tag holding  
13 portion.

14 15. A fastener assembly according to claim 14, wherein  
15 said connecting portion is connected to a surface of either one of said  
16 bulged massive portion or said tag holding portion through a point  
17 contacting portion.

18 16. A fastener assembly according to claim 10, wherein  
19 at least one of said rails is provided with an indexing system.

20 17. A fastener assembly according to claim 16, wherein  
21 said indexing system is selected from a group consisting a concaved  
22 portion, a projected portion and a hole portion each being formed on a  
23 surface of said rails.

24 18. A fastener assembly according to claim 9, wherein  
25 at least one of said rails is formed on a surface formed by said  
26 plurality of filament portions of said fasteners.

27 19. A fastener assembly according to claim 9, wherein  
28 at least one of said rails is formed over a surface formed by said  
29 plurality of filament portions of said fasteners, with a certain distance.

1                   20. A fastener assembly according to claim 9, wherein  
2 all portions of said fastener assembly are integrally formed into one  
3 body with the same material.

4                   21. A fastener attaching device for shooting unit  
5 fasteners one by one utilizing a fastener assembly in which a plurality  
6 of unit fasteners each having a filament portion and at least one  
7 bulged massive portion provided on at least one end portion of the  
8 filament portion, each one of the plurality of fasteners being  
9 adjacently arranged to each other, so that each one of the filament  
10 portions are arranged parallel to each other, wherein at least one of  
11 the bulged massive portions of each one of the fasteners is  
12 simultaneously connected to a rail, said fastener attaching device  
13 comprising

14                   a main body,  
15                   an operating lever,  
16                   at least one hollow needle provided on an end portion of  
17 said main body,

18                   a pushing pin passage,  
19                   a pushing pin which slides through said pushing pin  
20 passage back and forth in response to an operation of said operating  
21 lever,

22                   a bulged massive portion gripping means,  
23                   a bulged massive portion supply path for moving the  
24 bulged massive portion of the fastener assembly, provided at a  
25 position with a predetermined angle with respect to said pushing pin  
26 passage,

27                   a rail moving passage provided inside said main body  
28 parallel to said bulged massive portion supply path, and

29                   a bulged massive portion supply means for supplying one  
30 of said bulged massive portions to said pushing pin passage in  
31 response to an operation of said operation lever.

1           22. A fastener attaching device according to claim 21,  
2 wherein an inside diameter of said hollow needle is substantially  
3 identical to or minimally larger than an external diameter of said  
4 bulged massive portion.

5           23. A fastener attaching device according to claim 21,  
6 wherein said bulged massive portion gripping means is provided with  
7 a portion for covering at least a part of a surface of said bulged  
8 massive portion and has a space inside for accepting a part of said  
9 surface of said bulged massive portion part therein.

10           24. A fastener attaching device according to claim 21,  
11 wherein said bulged massive portion supply means supplies a bulged  
12 massive portion to said pushing pin passage before said bulged  
13 massive portion gripping means, which is provided at an end portion  
14 of said pushing pin or a tip portion of the pushing pin, passing by said  
15 intercrossing portion formed between said bulged massive portion  
16 supply passage and said pushing pin passage in response to an  
17 operation of said operation lever in the vicinity of said bulged  
18 massive portion supply means.

19           25. A fastener attaching device according to claim 21,  
20 wherein a connecting portion cutting means for cutting a connecting  
21 portion connecting said bulged massive portion to said rail in  
22 response to an operation of said operation lever, is provided in the  
23 vicinity of said bulged massive portion supply means.

24           26. A fastener attaching device according to claim 21,  
25 wherein at least a part of said bulged massive portion gripping means,  
26 a connecting portion cutting means for cutting a connecting portion  
27 connecting said bulged massive portion to said rail in response to an  
28 operation of said operation lever, is provided.

29           27. A fastener attaching device according to claim 24,  
30 wherein said bulged massive portion gripping means and said pushing  
31 pin perform respective sliding motions different from each other.

1                   28. A fastener attaching device according to claim 21,  
2 wherein the fastener assembly has a plurality of unit fasteners each  
3 comprising a filament portion and two bulged massive portions  
4 provided at both end portions of said filament portion, and each one  
5 of the plurality of said fasteners are adjacently arranged to each other,  
6 so that each one of said filament portions thereof are arranged parallel  
7 to each other, and further wherein said device is provided with a pair  
8 of said hollow needles, a pair of said pushing pins, a pair of said  
9 pushing pin passages, a pair of said bulged massive portion gripping  
10 means, a pair of said bulged massive portion supply paths, a pair of  
11 said rail moving passages and a pair of said bulged massive portion  
12 supply means.

13                   29. A fastener attaching device according to claim 27,  
14 wherein when said fastener assembly is to be mounted on said device,  
15 said fastener assembly is mounted thereon so that a direction along  
16 which each one of said filament portions are arranged is set so as to  
17 intercross with said center axis of said pushing pin path at a  
18 predetermined angle, wherein said filament portions are longer than  
19 the shortest distance between said pushing pin passages.

20                   30. A fastener attaching device according to claim 28,  
21 wherein said bulged massive portion supply means includes a pair of  
22 rotating members each having a plurality of fastener engagement  
23 members on a peripheral surface thereof which can engage with a  
24 predetermined portion of each one of said unit fasteners or said  
25 indexing means provided on said rail, so as to move said unit  
26 fasteners by a predetermined distance in a predetermined direction.

27                   31. A fastener attaching device according to claim 30,  
28 wherein said rotating member comprising a pair of circular plates.

29                   32. A fastener attaching device according to claim 30,  
30 wherein a common rotating axis of said rotating members intercross

1 in a direction along which each one of said filament portions are  
2 arranged, at a non-perpendicular angle.

3 33. A fastener attaching device according to claim 30,  
4 wherein a pair of said rotating members are rotated by a common  
5 driving member which is driven in response to an operation of an  
6 operation lever, the rotating directions of each one of said rotating  
7 members being different from each other.

8 34. A fastener attaching device according to claim 27,  
9 wherein said pushing pin penetrates through an inside hollow path of  
10 said bulged massive portion gripping means.

11 35. A fastener attaching device according to claim 34,  
12 wherein a moving range of said pushing pin is larger than that of said  
13 bulged massive portion gripping means.

14 36. A fastener attaching device according to claim 34,  
15 wherein said pushing pin is connected to a second slider member  
16 which is connected in turn to a driving member driven in response to  
17 said operation lever while said bulged massive portion gripping  
18 means is supported on a first slider means, which being provided with  
19 a control means which can contact said second slider means during  
20 one time period so that said first slider means can be driven with said  
21 second slider means, and can be disconnected from said first slider  
22 means during another time period so that said first slider means stops  
23 its movement while said second slider means is still moving.

24 37. A fastener attaching device according to claim 36,  
25 wherein said control means is provided with a stopper member on a  
26 part of said control means which can contact said second slider means  
27 during one time period, and said stopper member can engage with a  
28 stopper member holding means which can hold said stopper member  
29 during another time period.

30 38. A fastener attaching device according to claim 36,  
31 wherein said first slider means is further provided with a base plate

- 1 having a hole through space therein through which said second sliding
- 2 means can move along said hole through space when said stopper
- 3 member is disconnected from said second slider member.
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